



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/714,331	11/16/2000	Howard M. Branz	NREL-99-01	4337

23712 7590 11/20/2002

PAUL J WHITE, SENIOR COUNSEL
NATIONAL RENEWABLE ENERGY LABORATORY (NREL)
1617 COLE BOULEVARD
GOLDEN, CO 80401-3393

EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 11/20/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/714,331

Applicant(s)

BRANZ, HOWARD M.

Examiner

Lynette T. Umez-Eronini

Art Unit

1765

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Claim Rejections – 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 3, and 8-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollingsworth (US 5,759,745) in view of Fukaya et al. (US 4,581,009).

Hollingsworth teaches a method of forming a hydrogenated amorphous silicon layer (Abstract and column 2, lines 48-55). The method comprises:

depositing a thin photoresist layer of hydrogenated amorphous silicon (α -Si:H) onto a substrate surface (column 3, lines 45-59; column 4, lines 27-34 and 40-50) by plasma enhanced chemical vapor deposition (column 4, lines 43-50), which read on,

providing an amorphous silicon film deposited on a substrate, the film having an exposed surface;

exposing UV light to α -SiH layer (column 5, line 61 – column 6, line 4) to remove hydrogen atoms off of the surface of the α -SiH layer wherein missing hydrogen atoms vacate “dangling bonds” (same as applicant’s light damaged region) (column 6, lines 11-14), which reads on,

illuminating the film with an essentially blue or ultraviolet light to form a light region. Since Hollingsworth uses the same method of illuminating an amorphous silicon layer as that of the claimed invention, then using Hollingsworth method would inherently form a stabilized.

Hollingsworth differs in failing to teach etching the light damaged region to expose a portion of the stabilized region, **in claim 1**.

Fukaya teaches termination of dangling bonds (same as applicant's defect) by halogen atoms during plasma etching, which reads on etching the surface to remove the defect.

It is the examiner's position that one having ordinary skill in the art at the time of the claimed invention would have found it obvious to modify Hollingsworth with Fukaya's method of etching to remove the defect (light damaged region) for the purpose of increasing the speed of a photo electronic device (Fukaya, column 5, lines 8-12) and the combination of Hollingsworth and also the combination of Hollingsworth and Fukaya would further produce a stabilized amorphous silicon film as that of the present invention.

3. Claims 4-6 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollingsworth ('745) in view of Fukaya ('099) as applied to claim 1 above, and further in view of Shimbo (US 4,624,737).

Hollingsworth differs in failing to teach etching comprises using a liquid etchant to remove 500 - 10,000Å and 700Å of silicon film, respectively **in claims 4 and 18**; and etching comprises using a reactive hydrogen in a plasma or

chemical vapor deposition reactor to remove 500 - 10,000Å and 700 Å of the silicon film, respectively **in claims 5 and 19**.

Shimbo teaches etching hydrogenated amorphous silicon by known wet, plasma and reactive ion etching methods (column 2, lines 5-60). Using Shimbo's etching method to remove hydrogenated amorphous silicon, which is the same method and material as claimed in the present invention, would result in removing 500 -10,000Å of the surface.

Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hollingsworth by using the etching method as taught by Shimbo for the purpose of using a few masking operations to produce a thin film that has good contact characteristics.

Hollingsworth differs in failing to teach after etching, repeating the steps of illuminating and then etching for a plurality of cycles wherein a population of a two-hydrogen complexes is increase in a bulk of the film, **in claim 6**.

It is well known that illuminating amorphous hydrogenated silicon produces dangling bonds (same as applicant's light damaged region) and etching deactivates the dangling bonds that are present on the surface of a substrate.

Hence, it would it would be inherent that by repeating the cycle of illuminating then etching the amorphous hydrogenated silicon would result in a population of a two-hydrogen complexes is increased in a bulk of the film and the plurality of cycles is for a number sufficient to reduce the hydrogenated amorphous silicon film to a predetermined thickness.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

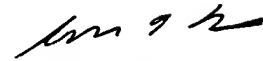
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is

Art Unit: 1765

assigned are 703-972-9310 for regular communications and 703-972-9311 for
After Final communications.

ltue

November 18, 2002



BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700